

Running head: OVERTRAINING DURING PRE-SEASON

Overtraining during Pre-season: The Perceived Causes of Stress and Negative Affective States
among Professional Rugby Union Players

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Abstract

The aim of this study was to explore the perceived factors that contribute to stress and negative affective states during pre-season among a sample of professional rugby union players. The participants were 12 male professional rugby union players between 18 and 21 years of age (M age = 19 years, $SD = 0.85$). Data were collected via semi-structured interviews and analyzed using an inductive content analysis procedure. Players identified training (structure and volume), the number of matches played and the recovery period, diet, sleep, and travel as factors that they believed contributed to their experience of stress and negative affective states. The present findings suggest that players may require more time to recover between matches, alongside interventions to help players manage the symptoms of stress and negative affect during times in which players are overtraining.

Keywords: rugby union, training, performance, qualitative, interviews, affect

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Professional rugby players spend numerous hours improving their technique, skill, and physical conditioning to maximize their performance. One important training principle used by coaches involves physically overloading players and then allowing these players to rest in order to raise the performance of players when they have recovered from the overloading phase of training, which is known as a supercompensation response (Budgett, 1990). This type of response can result in enhanced sport performance (e.g., Steinacker & Lehmann, 2002). The phase of the season in which players are physically overloaded is pre-season; however, supercompensation responses might not have occurred by the time the season starts (e.g., Armstrong & VanHeest, 2002). Indeed, it has been suggested that there is a fine line between performance optimization, which intentionally produces over-reaching, and impairment due to overtraining, and that sometimes the principle of overload is misapplied (Budgett, 1990).

Conceptualizing and diagnosing overtraining in sport remains controversial (e.g., Polman & Houlahan, 2004; Richardson, Andersen, & Morris, 2008). It appears that overtraining is a multidimensional construct that is associated with both sport and non-sport stressors. For example, Steinacker and Lehmann (2002) suggested that overtraining results in a long lasting performance deficit due to an imbalance of both sport and non-sport specific stressors. Steinacker and Lehmann, along with other scholars (e.g., Halson & Jeukendrup, 2004; Hooper & Mackinnon, 1995; O'Toole, 1998; Urhausen & Kindermann, 2002), have suggested that athletes who are overtraining often report a number of clinical problems, including injuries, infections, mood disturbances, and fatigue.

Furthermore, additional research suggests that overtraining is characterized by negative affective states (e.g., Hooper, MacKinnon, & Hanrahan, 1997). Affect is much more

general than either mood or emotions, and is crucial for motivation (Batson, Shaw, & Oleson, 1992). An individual always feels something, whether slightly pleasant or utterly depressed, there is always an affective tone within our conscious awareness (Kuppens, Van Mechlen, Nezlek, Dossche, & Timmermans, 2007). Affect can be measured on two different dimensions: positive-negative, and activation-deactivation.

Context for the Current Study

A recent study by Nicholls, Backhouse, Polman, and McKenna (2009) examined stressors using the Daily Analysis of Life Demands in Athletes (Rushall, 1990), and affective states via the Activation Deactivation Adjective Check List (Thayer, 1989), among 16 professional rugby union players over 28 days. Players reported an array of physical stressors, which are indicative of the players' overtraining (e.g., Halson & Jeukendrup, 2004; Hooper & Mackinnon, 1995; O'Toole, 1998). For example, the players in Nicholls et al. study reported an array of physical stressors that were significantly "worse than normal." These physical stressors included muscle pain, tiredness, and unexplained aches. In addition to physical stressors, the athletes also reported that a number of life stressors were worse than normal, including diet, home-life, sleep, and relationships with friends. Furthermore, the athletes reported being in a low-activated unpleasant state throughout the 28-day study. This is a negative affective state, which is associated with both fatigue and lethargy. Neither fatigue nor lethargy is associated with optimal sport performance, and according to Hooper et al. (1997), such a negative affective state is an indicator that an athlete might be overtraining.

The results of the study by Nicholls et al. (2009) were presented to the club officials and coaches, who were concerned about the findings. The coaches commissioned the first author of the present study to identify the possible contributors to these problematic findings of stress and negative affective states among the sample. To our knowledge no qualitative studies have explored the risk factors associated with these symptoms, which is surprising

because it could be argued that players could be an excellent source of information on these important constructs. As such, based upon previous recommendations (e.g., Botterill & Wilson; 2002; Richardson et al., 2008), the purpose of this paper was to identify the players' experiences and perceptions of the factors that caused stress and negative affective states during pre-season, when they were overtraining.

Method

Participants

The participants in this study were 12 Caucasian professional male rugby union players, who resided in the United Kingdom. The age of the participants ranged between 18 and 21 years (M age = 19 years, SD = 0.85 years). The players had played rugby union for between 7 and 15 years (M playing experience = 9.42 years, SD = 1.83 years), but were in only their first or second season as a full time player. The playing positions were hooker (n = 3), prop (n = 2), back row (n = 2), winger (n = 2), fly-half (n = 2), and centre (n = 1). Eight of the participants had represented England at under-16 or under-18 levels. In addition to playing full time rugby union, nine of the participants were also full-time students studying for an undergraduate degree. All of the participants volunteered to take part in this study and completed an informed consent form prior to research participation. To protect the anonymity of the players, pseudonyms have been used in this paper. The study received approval from a University Ethical Advisory Committee.

Procedure

Sixteen participants from the study by Nicholls et al. (2009) were sent a letter detailing the nature of the interview study. Fourteen participants agreed to participate in the present study, with 12 attending their scheduled session. The interviews were conducted in an office at the training ground of the rugby union club.

Data Collection

All 12 participants took part in a semi-structured interview, which lasted between 40 and 70 minutes. The lead researcher asked a series of open-ended questions to explore players' experiences and the perceptions of the factors that led to physical stressors (e.g., fatigue, muscle soreness, unexplained aches) and low energy levels during pre-season.

Interview Schedule

Interviews were conducted by the first author and started with him summarizing the previous research findings of Nicholls et al. (2009). The participants were then presented with their individual profile, which summarized their own life stressors (e.g., diet, work, and sleep), symptoms of stress (e.g., muscle pains, skin rashes, and body swellings), and affective state (energy and tiredness) findings for the initial 28-day study in the form of tables, graphs, and a circumplex. The lead researcher asked the participants to verify the accuracy of their profile, in terms of the players' own perceptions of the 28-day study. Overall, the questions were directed towards the players describing most salient life stressors, symptoms of stress, and affective states for each participant from their profile. Participants were then asked questions relating to exploring the possible reasons for such findings. For example, a question to a player who reported muscle pains during the initial 28-day study was asked: "you reported muscle pains being worse than normal on training days and rest days, but not match days. Could you describe some of the periods in which you experienced muscle pains during the initial 28-day study and how you felt?" The participant was then asked to "describe the factors that you perceived contributed to these feelings of muscle pains during the study." These types of questions were asked in relation to other stressors and affective state findings. The interview guide is available upon request from the first author.

Data Analysis

The interviews were coded to ensure confidentiality and were transcribed verbatim. Transcribed interviews were inductively content analyzed in accordance to the procedures

outlined by Maykut and Morehouse (1994). Similar factors that caused stress and negative affective states were given descriptive labels and a rule of inclusion. For example, the first order-theme labeled as *diet* was allocated the rule of inclusion: “The quantity and quality, or both, of the food that the players consumed that players felt contributed to how they felt during pre-season.” All of these factors were categorized as six first-order themes. Inter-rater reliability checks were conducted between the first and second authors, and the first and third authors, which revealed 97% and 100% agreement, respectively. Following minor changes, there was 100% agreement between the first and second authors, and the first and third authors.

Member-checking

Participants were e-mailed a summary of their interview findings regarding their descriptions and explanations regarding their experiences in the initial 28-day study, before being asked questions relating to the accuracy of their interview profile, which is known as member-checking (Lincoln & Guba, 1985). These member-checking interviews were conducted over the phone and typically lasted between 5-10 minutes. Member-checks are important, because they help ensure that what was reported actually happened, and that portrayals are accurate to those who had lived the experience (Holt & Hogg, 2002). There were three main questions involved in the member-checking phone interviews, which were: (a) Is this profile representative of your experiences? (b) Is there anything you would like to add to your profile?, and (c) Is there anything that your would like removed from your profile? This provided participants with the opportunity to clarify or change what they had previously stated in their interview, or add additional information.

Results

Overall, the players attributed their symptoms of stress and negative affective states in pre-season to training volume ($n = 11$), training structure ($n = 8$), the number of matches

played and the recovery period ($n = 6$), diet ($n = 9$), sleep ($n = 11$), and travel ($n = 6$). Each factor is discussed separately below.

Training Volume

Eleven players reported that a high training volume was a contributing factor to the stress and negative affective states they experienced during pre-season. This quotation from Thomas, a center in his first season as a full time player, reveals how the training volume contributed to a variety of symptoms:

We did a hard pre-season running-wise, which is why I was low on energy and quite tired. I think I wrote down I was quite tired and a need for more rest, as well as having bad muscle soreness. All of the training sessions have been re-adjusted. My energy is a lot better now.

Thomas revealed how the high training volume based on running resulted in a number of symptoms. Samuel also attributed his low levels of energy and tiredness to his training volume, as he was also involved in additional training:

I think I was tired during the study just because I was not playing as well and doing lots of [additional] training on my own kicking and things like that. I was trying to improve personal things so was more tired, physically especially.

Once the season began, the amount of training in which the players engaged was somewhat reduced, which eased the stress and negative affect. The following quotation from Oliver revealed how he felt better once his training volume was reduced:

I'm quite a bit better now because there is not such a volume of training. I think that was the case of a lot of training, knowing [that] you have 6 solid days in front of you again so and that is all fine now with us having 1 day off in the middle of the week. It has been addressed since the start of the season, and the conditioners knew we needed

more rest and so did the coaches but it was because we were a new squad we were just going to have to do it for 6-8 weeks and then we can do it the way we do it now.

Training Structure

The structure of the training days was also perceived to be a cause of physical stressors and negative affective states among eight of the players, as the quote from Seamus, a prop forward, reveals:

At the start of the season with me being involved in the first team I had to come in for a forward review. I would play on a Monday night [for the reserves], got home at about 11 pm and had to be up at 7:30 [the following morning], come back in for 9 o'clock the following morning. They did this for the first 2 weeks but decided not to again because the academy boys were not really with it. They decided to do it later. I would be turning up knackered, body aching and everything like. We want the team together but it would have been more beneficial to get more sleep. They do separate reviews so everybody can still watch it, but not so that everybody is exhausted whilst they are watching it and paying attention to it.

Seamus illustrates how the structure of the training week took its toll on him and affected his match performance:

It was the build up of the whole week and I felt dead and buried at the start of the season. My body was shaking and everything. We only got 2 days off... one day before a match and one day after a match at that time in the season. We were training full time down here and some players were feeling a bit sore and stuff. I think during the game it affected my performance because I was feeling tired quicker instead of lasting the 80 minutes and I was feeling it more in the second half rather than at the back end of the second half. I felt like I was getting more knocks and bruises and aches and pains after a game.

Number of Matches Played and the Recovery Period

The number of matches played and a lack of time to recover were perceived as contributing to the symptoms of overtraining among six of the players. Noah explained how he typically felt after a match, which explains why participating in a number of matches without a sustained recovery period may contribute to symptoms of stress and negative affect:

The way I play, the first 3 days after a game maybe four I feel ruined. It is to do with the game and the intensity of the game. It just ruins me, it really does. A lot of things I struggle with is my back and stuff like that. A lot of aches and pains come from there even though I have had it for a year there is nothing you can do about it, it is just an occupation hazard and you have to put up with it and get on with it. It gets annoying sometimes. I don't always notice it but when I am driving or walking around town and that after half an hour walking around my back is just gone and it gets really annoying. I am doing something I enjoy so I put up with it.

Liam, a prop forward, illustrated the consequences of playing twice in 3 days. Liam was asked to play on a Wednesday, having previously played 2 days before on the Monday:

I was down here [at the training ground] at 7:30 [am] I was tired anyway, did not know I had to play on the Wednesday and got a text asking me to play. I was a bit like 'Oh no,' but when somebody says you are needed you don't want to let people down. I was quite fatigued and tired. I got down there and he said I was starting, and I was like 'Oh God,' muscle pains were so bad as I had done a max session, finding out our maxes in the morning. I had just done squats and bench presses. My legs and arms were just gone. As a prop you need both legs and arms, so I was very tired. I had driven down there [to the match venue]. I was not in the frame of mind. I was tired, lethargic, [and] didn't feel in the game.

After further questioning, Liam revealed how he would have liked his week to be structured:

I would much rather play on a Monday and do fitness on a Wednesday rather than play 40 minutes on Monday and then go and do 50 with the university. That is something they have got to decide on. Eighty minutes is good for me, but I would rather do it in one go, rather than winding yourself up for 40 and then another 50 minutes on a Wednesday. At the end of last season I had a double hernia operation because of over stress playing too much from school.

The quotes by Liam and Noah expressed themes that were cited among six of the players in the study. Playing two games in the space of two days was very demanding and a perceived cause of stressors and negative affect, even without the players playing a full 80 minutes in either match.

Diet

Nine players mentioned that their diet contributed to the stress and negative affective states that they experienced during pre-season. This was linked to the players not eating enough food to fuel their training and not having the time to eat high quality food between training sessions. Liam illustrates how important players thought their diet was:

My tiredness comes from not eating regularly. So that is one of the things I'm looking at, at the moment because I have been feeling a bit tired. On match days I get up and I have something really good to eat. I will be eating all the way through to the game and I am also more re-hydrated. During pre-season, I came in I hadn't had any breakfast I was feeling a bit hungry and de-hydrated and did my weights session. Smashed it out on the weights and then went out on the field and was feeling a bit 'Oh, I'm a bit knackered now.'

Liam typified others' comments regarding the importance of diet in offsetting fatigue. Noah also had a similar experience, regarding diet during training:

It is difficult with the diet on training days, because it is quite hectic, you know that you don't eat as well and you try and ram food in because you know you are missing out on what you need. I try to have food to make me happy as well, because I know that if I'm feeling happy I will be better going into the game.

Similar to Noah, Pearson explained the negative consequences of not eating properly, which made him feel run down:

With my traveling I did not have strict meals and I was snacking I was traveling and I did not... I only had one decent meal a day during pre-season. It did not benefit me at all. I personally felt more run down from not eating properly.

These quotes from Liam, Noah, and Pearson reveal the importance of diet as a contributing factor to overtraining symptoms. But, the players thought there was no time to eat properly on a training day, as Luke reveals, "if you are in a meeting for 2 hours and then straight out on the pitch for 2 hours it is quite difficult."

Sleep

The present study revealed that 11 of the players were not getting enough sleep, and when they were asleep, they were not getting good quality sleep during pre-season. They perceived that this factor intensified their feelings of stress and negative affect. Oliver revealed how he struggled to sleep after evening matches:

Once we have finished the game I don't find myself being able to calm back down or whatever and don't get to sleep. I end up sitting up until 1 or 2 o'clock in the morning. I think that decreases my recovery time and makes me feel very tired on the rest day. We have a meal after the matches. The first two matches of the season were away and they were all quite long distances which made things worse. On the match days I ended up doing this later as we did not get back in and I was feeling much more tired anyway

A player not being able to get to sleep was a common theme, but sleep quality was reported to be a more prevalent issue. Indeed, five players reported that sleeping poorly resulted in tiredness, as Peter highlighted:

I remember one night when I was very tired and although I got to sleep okay and slept through the night, I had that sort of feeling where you feel you have not been to bed and wake up feeling tired. When I am tired or carrying knocks you just don't feel well. Although you are asleep you still feel as though you can feel them even when sleeping and feel tired the next day.

This player attributed his poor sleep to bruises sustained from playing rugby. Noah noted how sleep was affected by the dietary supplements the players were taking (provided by the club):

One of the things I find is that some of the supplements I take give me mixed sleep patterns, so I wake up a lot or sleep fine. My missus says that I always do stupid things in the bed like I grab her and kick her. The other night I was throwing my hands out and punching the side of the wall, but just because of the supplements and some of the stuff that we take which I think at this time I was on some sort of stuff that does that to me. This increases your lean muscle and decreases your body fat but it does make you – there are lots of side effects that can affect your sleep. I am not on a lot at the moment and I'm sleeping alright.

These quotes illustrate the importance of sleep and how the players believed this factor contributed to symptoms of overtraining, such as tiredness.

Travel

Four players reported travel as a potential cause of the symptoms of stress and negative affective states. Peter attributed his tiredness and poor subsequent match performances to traveling during the pre-season:

It was a long journey with 5 hours on the bus, which could have contributed to it as well [poor performance]. I have been suffering with my body at the beginning of the season when I was fighting for my place. I was on the bench for the first team but still playing for the second team as well so I was preparing for two games a week and spending a lot of time on buses traveling all over the place. That was not good for me and was really hard work.

The players in this study were all new to professional rugby, and were not accustomed to the travel demands. Thomas explained:

That was to do with the travel on match days which was an issue at that point. I'm getting used to when you are playing away the length of time traveling in terms of drowsiness. I don't so much mind now it is just the long bus journeys it is just that it makes me feel shattered. I don't think it particularly affects me in the game, just while I'm traveling and while I'm in the hotels. As soon as you are at the ground to play I don't really feel it. This week we have 9 hours traveling on the bus.

In addition to traveling to away matches, some players lived an hour's drive from the training ground. Liam illustrates this:

When I'm driving in if it is really busy you are thinking it is going to take an hour to get in and that sort of stuff and I have to get up early on a morning to get the good structured meal in which is quite difficult. I do need my sleep because I have university and all the stuff down here, plus the journey time as well. It does play havoc if you know what I mean.

Long trips to away matches and the daily journeys to training were cited by the players as a perceived cause of the stress and negative affect that they experienced.

Discussion

The aim of this paper was to identify the athletes' experiences and perceptions of the factors that caused stress and negative affective states during pre-season when they were overtraining. Our findings revealed the players perceived seven factors, which contributed to the experience of these symptoms, including training (structure and volume), number of matches played and recovery period, diet, sleep, and travel. However, there was some individual variability as not every player reported each factor. The athletes' perceptions are in line with Botterill and Wilson's (2002) claim that overtraining is a multifaceted phenomenon. Present findings also provide details of how symptoms such as stress and negative affect may arise during periods in which players are overtraining.

At the present time, researchers have not qualitatively explored the risk factors associated with stress and negative affective states when players are overtraining, such as during pre-season (Richardson et al., 2008). The present study suggests that both training volume and structure are perceived as being distinctive causal risk factors of physical stress and negative affective states. However, a number of non-training risk factors are also perceived to induce both stress and negative affect. Some of these factors are inherent to life as a professional rugby player, including the number of match appearances and the accompanying travel. However, diet and sleep were also perceived as important factors in restricting restorative rest, therefore seen as contributing to symptoms. These findings provide some support for previous research that a lack of recovery time (e.g., Fry, Morton, & Keast, 1991) and inadequate sleep (e.g., Kellman, 2002) are risk factors associated with athletes who are overtraining. According to self-report, lack of sleep and sleep quality were perceived to be important risk factors that contributed to the players' fatigue. Lack of sleep in professional rugby league players has been associated with a negative mood profile (more tense, tired, miserable, weary, depressed, and anxious) and lower self-rated performance in away games (e.g., Polman, Nicholls, Cohen, & Borkoles, 2007). Further research is required to assess the

impact of interventions to improve sleep quality among professional athletes. Relaxation interventions could be helpful, although research should test the efficacy of these types of interventions on affective states over a prolonged period of time.

This study highlights the importance of rest within the training regime in order to optimize an athlete's recovery. Our data suggest that more days may be needed for adequate recovery than the players presently receive. Kentta and Hassmen (1998) suggested that recovery should be a key feature of any training program and coaches should be proactive rather than being reactive to any performance deficits that may occur due to heavy training loads. To date, there is still limited information on how overtraining is best assessed, but our data on athletes' perceptions suggest that athletes could be an invaluable resource in monitoring both training load and recovery.

To help eliminate or reduce symptoms of stress and negative affective states, changes could possibly be made to the rules of professional rugby within the United Kingdom. Based on the findings of the present study and Nicholls et al. (2009), regulations could be introduced to prevent players from participating in more than one game in any 5-day period; this would be akin to Health and Safety legislation that governs the work practice of most employees in the UK. However, further research is required to assess the impact of this recommendation on symptoms of stress and affective states among a much larger sample of professional athletes. Such changes may elicit a reduction in the symptoms of stress and the increasing injury rate in rugby union (e.g., Bathgate, Best, Craig, & Jamieson, 2002; Brooks, Fuller, Kemp, & Reddin, 2005).

Future research should monitor symptoms of stress and affective states among a larger sample of professional rugby players, from different professional clubs, to assess the extent of this phenomenon. Research could also examine stressors and negative affect over sustained periods, such as a season, to assess whether the symptoms of overtraining fluctuate across the

professional year. This is important so that coaches can tailor their training sessions to maximize player performance and well-being.

Several limitations of this research should be considered. Firstly, we had a sample of 12 Caucasian male rugby union players, so it is difficult to generalize our findings to athletes from different sports, female athletes, or athletes of different ethnicities. Furthermore, we relied on the players' perceptions of why they felt they experienced stressors and negative affective states and there may be other factors that the players are not aware of that contributed towards them experiencing stressors and negative affective states. Another issue relates to the measurement of overtraining. Previous scholarly activity (e.g., Halson & Jeukendrup, 2004) has suggested that researchers need controlled experiments to more precisely measure whether indeed an athlete is overtraining. However, the coaches indicated that the players were going through an intensive training schedule during the initial study by Nicholls et al. (2009), which was supported by the players themselves. Furthermore, the players exhibited symptoms associated with overtraining such as negative affect (e.g., Hooper et al., 1997) and numerous physical stressors (Budgett, 1990; Urhausen & Kindermann, 2002). For these reasons, we assumed that the players were indeed overtraining. Future research could examine stress and affect with a more varied participant sample and additionally explore age-related differences.

Conclusion

The present study sought to identify the risk factors that athletes perceive to be associated with their experiences of stress and negative affective states during periods of overtraining during pre-season. Players identified training (structure and volume), the number of matches played and the recovery period, diet, sleep, and travel as factors that they believed contributed to their experience of stress and negative affective states. The present findings suggest that players may require more time to recover between matches, alongside interventions to help players manage the symptoms of stress and negative affect during times

in which players are overtraining. In particular, interventions to help the players sleep could be very beneficial.

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